



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Adress: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/535,525	07/01/2005	Wolfgang Paulus	13111-00021-US	9339
23416	7590	08/18/2010	EXAMINER	
CONNOLLY BOVE LODGE & HUTZ, LLP			UNDERDAHL, THANE E	
P O BOX 2207			ART UNIT	PAPER NUMBER
WILMINGTON, DE 19899			1651	
MAIL DATE		DELIVERY MODE		
08/18/2010		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/535,525	<b>Applicant(s)</b> PAULUS ET AL.
	<b>Examiner</b> THANE UNDERDAHL	<b>Art Unit</b> 1651

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 08 June 2010.  
 2a) This action is FINAL.      2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 23-26, 28-30, 33-37, 39, 41, 42 and 46-58 is/are pending in the application.  
 4a) Of the above claim(s) 47 and 50-58 is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 23-26, 28-30, 33-37, 39, 41, 42, 46-49 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsman's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO/SB/08)  
 Paper No(s)/Mail Date \_\_\_\_\_

4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_

5) Notice of Informal Patent Application  
 6) Other: \_\_\_\_\_

**Detailed Action**

This Office Action is in response to the Applicant's reply received 6/8/2010. Claims 23-26, 28-30, 33-37, 39, 41, 42, 46-58 are pending. Claims 47, 50-58 are withdrawn. Claims 27, 31, 32, 38, 40, 43-45 are cancelled. Claims 23, 30, 33, 42, and 48 have been amended. Claims 49-58 are new. Claims 23-26, 28-30, 33-37, 39, 41, 42, 46-49 are considered in this Office Action.

**Office Generally Does Not Permit Shift**

Newly submitted claims 50-58 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

**DISTINCT PROCESSES**

Inventions presented in new claims 50-58 are directed to distinct processes. The related inventions are distinct if: (1) the inventions as claimed are either not capable of use together or can have a materially different design, mode of operation, function, or effect; (2) the inventions do not overlap in scope, i.e., are mutually exclusive; and (3) the inventions as claimed are not obvious variants. See MPEP § 806.05(j). In the instant case, the inventions as claimed comprise methods of different steps and starting materials which would therefore lead to distinct products. The invention of claim 23 and dependant claims are drawn towards steps for making incompletely acrylated polyols enzymatically, while the invention of claim 50 is to producing a coating or film on a substrate. Furthermore

As outlined in M.P.E.P. § 819, the general policy of the Office is not to permit the applicant to shift to claiming another invention after an election is once made and action given on the elected subject matter. Note that the applicant cannot, as a matter of right,

file a request for continued examination (RCE) to obtain continued examination on the basis of claims that are independent and distinct from the claims previously claimed and examined (i.e., applicant cannot switch inventions by way of an RCE as a matter of right). When claims are presented which the examiner holds are drawn to an invention other than the one elected, he or she should treat the claims as outlined in MPEP § 821.03.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 50-58 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

#### **Response to Applicant's Arguments**

In the response submitted by the Applicant, the 35 U.S.C § 103 (a) rejection of remaining claims in the response submitted by the Applicant, the 35 U.S.C § 103 (a) rejection of claims 23-26, 28-30, 33-37, 39, 41, 42, 46, and 48 over Brown et al., Petrone and Perner et al. were considered but not found persuasive. over Brown et al. were considered but not found persuasive. The Applicant argues that the specific lipases of *Candida Antarctica B* or *Burkholderia sp.* show unexpected results since these polyols were "able to produce a polymer coating having markedly improved profile of properties" (Applicant's Response, page 11, bottom). The Applicant draws the Examiner's attention to Examples 1-3 and 5-10 and paragraph [0159] of the Published Specification. However this claim of unexpected results is not commensurate with the scope of the claims. As mentioned above, claims 50-58 are withdrawn from

consideration as being a distinct invention. The claims under examination are simply to the enzymatic synthesis of incompletely acrylated polyols and not towards a method of making a coating. Also the Examples presented in the specification did not show any indication of how the lipase of *Candida Antarctica B* or *Burkholderia sp.* were superior to other lipases. Indeed the Applicant specification indicates that all lipases in EC 3.1.1.3 from sources as varied as *Pseudomonas sp.* or porcine pancreas are suitable for this invention (Applicant's Specification, pg 6, lines 7-15). Therefore this argument of unexpected results does not overcome the current art of Brown et al. which is rephrased below to address the new claimed amendments.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 23-26, 28-30, 33-37, 41, 42, 46, 48 and new claim 49 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Brown et al.

These claims are drawn to the method of enzymatically synthesizing incomplete polyol acrylates with a lipase from either *Candida antarctica B* or *Burkholderia sp.* An aliphatic polyol with at least 3 carbon atoms and at least 3 esterifiable hydroxyl groups is reacted with an acrylic acid compound or alkyl ester of an acrylic acid in a liquid medium comprising an organic solvent in the presence of hydrolases such as lipases, glycosylases or proteases. The liquid medium contains less than about 10% by volume water. The acrylic acid compound and polyol are used in a molar ratio of 100:1 to 1:1.

The acrylic acid compound can be simply an acrylic acid, lower-alkyl-substituted acrylic acid or alkyl ester thereof. The polyol can be a variety of compounds including glycerol or sugars such as sorbitol and mannitol. The solvent can be selected from THF or various other ethers such as diethyl ether. The reaction temperature is from 0 to about 100 °C. The phase of the reaction can be single or multiphased with the reactants in suspension or emulsion. Also water is removed from the solution during transesterification.

Brown et al. teach a process for the enzymatic synthesis of polyol acrylates by consisting essentially of reacting an aliphatic polyol such as glycerol, triglycerol, mannitol, adonitol, sorbitol and xylitol and many others (col 18, lines 35-50) with an acrylic acid compound such as acrylic acid or ethyl or allyl acrylate (col 18, lines 33-35) using an enzyme such as esterases, lipases and acyltransferases (col 18, lines 46-47). Brown et al. explicitly teaches that a 1-, 3- specific lipase can be used (col 36, lines 53-65). This lipase inherently esterifies only the 1 and 3 positions of the polyol but not the 2 position which leaves the whole polyol incompletely acrylated (col 36, lines 55-65). The solvent may be hexane (col 32, lines 29), ether (col 20, lines 5-10) THF (col 18, line 45) or pyridine (col 10, line 17). The reaction temperature can be from 35-60 °C (col 12, lines 15-20). The reaction mix contains between 0.01 to 5% water (col 35, lines 5-6). The reaction can be single-phased (col 75, Example 3) or an emulsion (col 66, lines 25-30). Water is removed from the reaction via molecular sieves (col 67, lines 30-35) or counter-current diffuser (col 19, lines 20-23).

Claims 25, 34 42 and 46 limit the amount of the reactants such as the enzyme, polyol and acrylic acid compound used. While the reference listed above does not specifically teach the limitations, one of ordinary skill in the art would recognize these amounts of reactants are result effective variables. Absent any teaching of criticality by the Applicant concerning these amounts it would be *prima facie* obvious that one of ordinary skill in the art would recognize these limitations are result effective variables which can be met as a matter of routine optimization (M.P.E.P. § 2144.05 II).

Also while Brown et al. exemplifies that their polyols are completely esterified and not necessarily teach incompletely acrylated polyols it would be obvious for one of ordinary skill in the art to achieve this by using additional teachings of Brown et al. They clearly teach that their glycerine-fatty acids esters can be produced as mono-, di-, or triglycerides based on the ratio of reactants (Brown, col 64, lines 35-42). Since mono- and di- glycerides of acrylic acid and glycerine would be considered "incompletely" acrylated polyols they meet the claimed limitations via routine experimentation. Furthermore Brown et al. support this by using 1,3-specific lipase that would inherently only esterify the 1 and 3 positions of glycerine and leave the 2 position as a hydroxy group and thus unacrylated (col 18, line 53). Also while Brown et al. does not teach the lipases specifically from *Candida Antarctica B* or *Burkholderia sp*, one of ordinary skill in the art would understand that lipases as enzymes perform the same reaction and therefore would be art recognized equivalents for the same purpose of enzymatic esterification reactions and obvious to substitute one for the other in the absence of unexpected results (M.P.E.P 2144.06).

Therefore claims 23-26, 28-30, 33-37, 41, 42, 46, 48 and 49 are obvious in view of the above references.

In the response submitted by the Applicant, the 35 U.S.C § 103 (a) rejection of claims 23-26, 28-30, 33-37, 39, 41, 42, 46, 48 and 49 over Brown et al., Petrone and Perner et al. were considered but not found persuasive.

The Applicant argues that Petrone teaches away from the present invention since they use a transacylase enzyme in their transesterification reaction rather than a lipase. However as mentioned in the previous Office Action (Dated 12/08/09, pg 7) Brown et al. already established that tansacylases and lipases as art recognized equivalents for the purpose of esterifying polyols with acrylates (Brown, col 18, line 46; acetyltranferase also known as transacylase, as supported by Answers.com). Therefore it would be obvious for one of ordinary skill in the art to substitute one enzyme for the other. While the Examiner appreciates that both lipase and transacylase have different mechanisms and E.C. numbers the rational used by the Examiner is based on M.P.E.P 2144.06 as one enzyme is a suitable substitute for the other as supported by Brown et al.

The Applicant continues to argue that the use of the acrylated monomers made by this method are very useful and unexpectantly superior in dual-cure polymerization. While these results are interesting and exciting they are not commensurate with the scope of the current claims. Therefore the rejection stands and is rephrased below to address the amendments.

Claims 23-26, 28-30, 33-37, 39, 41, 42, 46, 48 and 49 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Brown et al. as applied to claims 23-26, 28-30, 33-37, 41, 42, 46, 48 and 49 above, and further in view of Pettrone et al. (U.S. Patent # 5240835, 1993) and Perner et al. (U.S. Patent # 5009805, 1991).

The description and rejection of claims 23-26, 28-30, 33-37, 41, 42, 46, 48 and 49 are listed in the 35 U.S.C § 103(a) rejection above. Claim 39 limits that the reaction product of polyol monoacrylates is reaction with a co-monomer to form a linear copolymer.

While Brown et al. teaches the production of a polyol monoacrylate he does not teach that these polyol monoacrylate can be polymerized with a co-monomer. However Pettrone et al. teaches, like Brown et al. that glycerol as well as other polyols (Pettrone col 6, lines 15-30) can be esterified with acrylates (Pettrone, col 5, lines 10-20) using the alternative enzyme transacylase (Pettrone, Abstract) which is also an enzyme taught by Brown et al. (col 18, line 44, called by its synonym acyltransferase, see Answers.com entry for support). Pettrone et al. teach that these products are polymerizable monomers (Pettrone, Abstract). While Pettrone et al. does not teach that these products are polymerized to make co-monomers. It is well established in the art that acrylate monomers are frequently used to make copolymers. One instance is given in the patent of Perner et al. who teach that the acrylate-polyol esters (col 3, lines 1-25) can be used to form copolymers (Perner et al. col 7-8 and Abstract). It would have been obvious to someone skilled in the art in view of the teachings above to meet the limitations of claim 39. Pettrone et al. teach similar acrylate-polyol esters to Brown et al.

and that these esters can be polymerized. Perner et al. teach that copolymers can be made from acrylate-polyol esters. Therefore it would have been obvious to someone skilled in the art to combine known prior art elements of acrylate-polyol esters according to known methods of copolymerization to yield the copolymers limited in claim 39.

Therefore the references listed above renders obvious claims 23-26, 28-30, 33-37, 39, 41, 42, 46, 48 and 49.

No claims are currently allowed in this application.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

**In response to this office action the applicant should specifically point out the support for any amendments made to the disclosure**, including the claims (MPEP 714.02 and 2163.06). Due to the procedure outlined in MPEP § 2163.06 for interpreting claims, it is noted that other art may be applicable under 35 U.S.C. § 102 or 35 U.S.C. § 103(a) once the aforementioned issue(s) is/are addressed.

Applicant is requested to provide a list of all copending U.S. applications that set forth similar subject matter to the present claims. A copy of such copending claims is requested in response to this Office action.

#### CONTACT INFORMATION

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thane Underdahl whose telephone number is (571) 272-9042. The examiner can normally be reached Monday through Thursday, 8:00 to 17:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn can be reached at (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Thane Underdahl  
Art Unit 1651

/Leon B Lankford/  
Primary Examiner, Art Unit 1651